

Abstract

The Goddard Space Flight Center (GSFC) Distributed Active Archive Center (DAAC), at ECS Release A and Release B, supports the science community by handling a wide range of data types related to Global Change research including land biosphere, ocean biology, upper atmosphere, atmospheric dynamics and heritage climate/land. The Data Assimilation Office/Data Assimilation System (DAO/DAS) is responsible for developing advanced assimilation algorithms which are used to process National Centers for Environmental Predictions (NCEP) [previously called National Meteorological Center (NMC)] observational data to produce research-quality gridded data products which are provided to various consumers. NCEP observational data are distributed to the DAO, as well as to ECS, via the ~~DAS~~ GDAAC Data Link Server (currently named “larry”), a GSFC DAAC component ~~which is an integral part of the DAS~~. At Release A (Release B) the DAO is external (internal) to the GSFC DAAC. In addition, Total Ozone Mapping Spectrometer (TOMS) Ozone data are supplied to ECS via the Version 0 (V0) System at the GSFC DAAC to be provided to other users. (Although the above-described NCEP and TOMS Ozone data interfaces represent the baseline at Release A and Release B, it should be noted that other options for accommodating these interfaces are under consideration.) At Release A and Release B, the handling and distribution of these various data sets involves a number of internal (ECS-to-ECS) and external (ECS-to-non ECS) interfaces. This Interface Control Document (ICD) defines the functional and physical design of only those external interfaces which exist between ECS and the non-ECS components at the GSFC DAAC--specifically the ~~DAS~~ GDAAC Data Link Server and the V0 System.

In particular, this ICD describes ECS-to-GSFC DAAC (i.e., ~~DAS~~ GDAAC Data Link Server or V0 System) data flows, specifically, for ingesting NCEP and TOMS Ozone ancillary data products needed to support TRMM Science Data & Information System (TSDIS) and/or Clouds and the Earth's Radiant Energy System (CERES), and/or Moderate Resolution Imaging Spectroradiometer (MODIS) standard product generation, either at the GSFC DAAC or at other locations. This ICD also addresses internetworking for ECS-to-GSFC DAAC ancillary data transfer (needed to support ECS and TSDIS standard product generation at the GSFC DAAC and/or at other sites); and internetworking for V0-to-V1 static data migration; and internetworking for V0/ECS interoperability; and internetworking between ECS and the GSFC Campus via external networks.

This ICD includes the precise data contents and format for each interface addressed in this document. State diagrams are provided which identify all the states, events/conditions, actions, and transitions. Additionally, data rates, file sizes, error conditions, error handling procedures and security are included. Communications protocols or physical media are also addressed for each interface.

This ICD is consistent with the external systems interface requirements at the GSFC DAAC, as described in the Earth Science Data and Information System (ESDIS) Project - Level 2 Requirements, the Functional and Performance Requirements Specification for the Earth

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~~Appendix A. Work-off Plan for ECS-GSFC DAAC ICD~~

Abbreviations and Acronyms

1. Introduction

1.1 Identification

This Interface Control Document (ICD), Contract Data Requirements List (CDRL) item 029 whose requirements are specified in Data Item Description (DID) 209/SE1, is a required deliverable under the Earth Observing System Data and Information System (EOSDIS) Core System (ECS), Contract (NAS5-60000).

1.2 Scope

This Interface Control Document (ICD) defines the external interfaces (i.e., between ECS and non-ECS components) within the Goddard Space Flight Center (GSFC) Distributed Active Archive Center (DAAC) for the Release A and Release B. The convention used in this document for mapping interfaces to releases is as follows:

- (1) release-specific interfaces are explicitly labeled as such (e.g., Release A or Release B).
- (2) interfaces that pertain to both Release A and Release B are not labeled.

ECS Releases are keyed to mission support: Release Ir1 provides support to TRMM Early Interface Testing and Science Algorithm I&T. Release A provides support to TRMM Science Operations and TRMM Ground Systems Certification Testing. Release A also provides the functional capabilities needed to support early ESDIS Ground System Testing for the EOS AM-1 and Landsat 7 missions. Release B provides support to EOS AM-1 Mission Operations and Science Operations, and it provides support to ESDIS Ground System Certification Testing for the EOS AM-1 and Landsat 7 missions. Release B also provides archive and distribution services for the Landsat 7 mission. Releases C & D provide evolutionary enhancements to the ECS services provided in the earlier Releases.

This document reflects the technical baseline maintained by the ECS Configuration Control Board in accordance with ECS technical direction (see Section 2.2). In particular, this ICD describes the following:

- a. Internetworking
 1. for ECS-to-Version 0 (V0) and ECS-to-~~DAS~~ GDAAC Data Link Server/larry ancillary data transfer (needed to support ECS and TSDIS standard product generation at the GSFC DAAC and/or at other sites)
 2. for Version 0 (V0)-to-Version 1 (V1) static data migration (involving the transfer of data holdings from the EOSDIS V0 system archive to ECS) [data migration addressed in further detail in Version 1 Data Migration Plan]

3. for V0/ECS interoperability [interface addressed in detail in ~~Interface~~ “Interface Control Document between the EOSDIS Core System (ECS) and the Version 0 System for Interoperability” Interoperability]
4. between ECS and the GSFC Campus via external networks
- b. ECS-to-V0 and ECS-to-~~DAS~~ GDAAC Data Link Server data flows, specifically, for accessing ancillary data products needed to support ECS standard product generation and TSDIS product generation.

The Earth Science Data and Information System (ESDIS) Project has responsibility for the development and maintenance of this ICD. Any changes in the interface requirements must be agreed to, and assessed at the ESDIS Project Level. This ICD will be approved under the signature of the ESDIS Project Manager.

1.3 Purpose and Objectives

This document is written to formalize the interpretation and general understanding of the interfaces between ECS and non-ECS components of the GSFC DAAC. This document provides clarification and elaboration of the ECS/non-ECS systems interfaces at the GSFC DAAC to the extent necessary to assure hardware, software, and operational service compatibility within the end-to-end system.

This document provides a point of mutual control of external interface definitions via the ESDIS Configuration Control Board (CCB).

1.4 Status and Schedule

This is the final ICD for the ECS/non-ECS systems interfaces at the GSFC DAAC. This ICD has been submitted as an ECS Project CCB approval Code 1 document. At the Government's option, this document may be designated to be under full Government CCB control. Changes may be submitted for consideration by Contractor and Government CCBs under the normal change process at any time.

~~Within this document are some interfaces that have associated TBRs, TBSs and/or TBDs. A table providing a Work-off Plan is in Appendix A. This plan provides the following information:~~

- ~~a. ICD I/F Issue No.~~
- ~~b. ICD Reference Paragraph~~
- ~~c. ICD Issue Priority~~
- ~~d. ICD Issue Type—Description~~
- ~~e. Work-off Plan Task(s)~~
- ~~f. Projected Resolution Date~~

1.5 Organization

Section 1 provides information regarding the identification, scope, purpose and objectives, and organization of this document.

Section 2 provides a listing of the related documents which were used as a source of information for this document.

Section 3 provides an overview of the interfaces for ancillary data exchange between the V0 System and ECS at the GSFC DAAC, and between the ~~DAS~~ GDAAC Data Link Server and ECS at the GSFC DAAC. This section also provides a context diagram.

Section 4 includes a detailed discussion of the data exchange framework. Specifically, the following topics are discussed: applicable internetworking protocols, network topology, polling with product delivery record, data transfer, product delivery record discrepancy, product acceptance notification, error conditions, error handling, backup methods, physical media, state diagrams, and data exchange security.

Section 5 addresses the data flows between ECS and the V0 System, and between ECS and the ~~DAS~~ GDAAC Data Link Server at the GSFC DAAC. The specific ancillary data products exchanged are identified including product name, file name, frequency, file size, volume and format. The minimum required metadata is identified.

~~Appendix A contains a table which identifies a Work-off Plan for all TBRs, TBSs and/or TBDs.~~

A list of abbreviations and acronyms is also provided.

305-CD-024-002	Release B SDPS Data Server Subsystem Design Specification for the ECS Project
305-CD-025-002	Release B SDPS Ingest Subsystem Design Specification for the ECS Project
305-CD-028-002	Release B CSMS Communication Subsystem Design Specification for the ECS Project
311-CD-002-004	Science Data Processing Segment (SDPS) Database Design and Database Schema Specifications for the ECS Project
160-TP-002-001	Version 1 Data Migration Plan [for the ECS Project], Technical Paper
175-WP-001-001	HDF-EOS Primer for Version 1 EOSDIS (White Paper for the ECS Project)
210-TP-001-006	Technical Baseline for the ECS Project
none	Goddard Space Flight Center, ECS Technical Direction No. 11, "PDR Technical Baseline," 12/6/94
423-33-03	Goddard Space Flight Center, Science Data Plan for the EOS Data and Information System Covering EOSDIS Version 0 and Beyond, Document Version 3, 7/94
540-032	Goddard Space Flight Center, EBnet - Distributed Active Archive Center (DAAC) Interface Control Document (ICD)
505-41-37	Goddard Space Flight Center, Interface Control Document between the EOSDIS Core System (ECS) and the Version 0 System for Interoperability
none	Goddard Space Flight Center, EOSDIS Version 0 to Version 1 Transition Plan (Draft), 11/23/93
none	EOS Data Assimilation Office Plan 1994 - 2000, 8/8/94
none	Nimbus-7 TOMS Data Products User's Guide" (NASA Reference Publication)
none	Meteor-3 TOMS Data Products User's Guide" (NASA Reference Publication)
none	Goddard Space Flight Center, DAAC Database Data Dictionary, Version 5.1, 11/27/95
NOAA ON388	National Oceanic and Atmospheric Administration, The <u>The</u> WMO Format for the Storage of Weather Product Information and the

Exchange of Weather Product Messages in Gridded Binary Form”
~~Form,~~” unreviewed manuscript, 11/93

3. Interface Overview

The Goddard Space Flight Center (GSFC) Distributed Active Archive Center (DAAC), at ECS Release A and Release B, supports the science community by handling a wide range of data types related to Global Change research including land biosphere, ocean biology, upper atmosphere, atmospheric dynamics and heritage climate/land. The Data Assimilation Office/Data Assimilation System (DAO/DAS) is responsible for developing advanced assimilation algorithms which are used to process National Centers for Environmental Predictions (NCEP) [previously called National Meteorological Center (NMC)] observational data to produce research-quality gridded data products which are provided to various consumers. NCEP observational data are distributed to the DAO, as well as to ECS, via the ~~DAS~~ GDAAC Data Link Server (currently named ~~“larry”~~ “larry”), a GSFC DAAC component ~~which is an integral part of the DAS~~. At Release A (Release B) the DAO is external (internal) to the GSFC DAAC. In addition, Total Ozone Mapping Spectrometer (TOMS) Ozone data is supplied to ECS via the Version 0 (V0) System at the GSFC DAAC to be provided to other users. (Although the above-described NCEP and TOMS Ozone data interfaces represent the baseline at Release A and Release B, it should be noted that other options for accommodating these interfaces are under consideration). At Release A and Release B, the handling and distribution of these various data sets involves a number of internal (ECS-to-ECS) and external (ECS-to-non ECS) interfaces, which are depicted, respectively, in Figures 3-1 and 3-2. There are three basic categories of sources providing these data sets to ECS at the GSFC DAAC, including the following:

- External interfaces (i.e., between ECS and a non-ECS system) where both sides of the interface are inside the GSFC DAAC (e.g., between ECS and the ~~DAS~~ GDAAC Data Link Server)
- External interfaces (i.e., between ECS and a non-ECS system) where ECS is located inside the GSFC DAAC, and the non-ECS system is located outside the GSFC DAAC (e.g., between ECS and NOAA)
- Internal interfaces (i.e., ECS-to-ECS interfaces) where one side of the interface is located inside the GSFC DAAC, and the other side of the interface is located inside a different DAAC (e.g., between ECS at the GSFC DAAC and ECS at the Langley DAAC)

This ICD only addresses external interfaces within the confines of the GSFC DAAC--i.e., between ECS and the ~~DAS~~ GDAAC Data Link Server, and between ECS and the V0 System. Also, it should be noted that discussions herein, of static data migration and V0/ECS interoperability, pertain, specifically, to internetworking--however, these topics are addressed in further detail in the following documents:

- Version 1 Data Migration Plan
- Interface Control Document between the EOSDIS Core System (ECS) and the Version 0 System for Interoperability

In particular, the NCEP is responsible for providing observational NCEP data to the **DAS GDAAC** Data Link Server. The **DAS GDAAC** Data Link Server, in turn, makes these NCEP products available, both, to ECS at the GSFC DAAC and the DAO. ECS (at the GSFC DAAC) then uses these NCEP products, and/or provides these products to ECS (at other DAACs, e.g., Langley), and/or provides these products to TSDIS, to support standard product generation at the respective sites. Furthermore, TOMS Ozone Data are supplied to ECS by the V0 System at the GSFC DAAC. ECS (at the GSFC DAAC) then provides these TOMS Ozone products to ECS (at other DAACs, e.g., Langley) to support CERES product generation. These products are made available to ECS via a ~~Polling~~ **“Polling with Product Delivery Record”** data transfer mechanism which is described in further detail in Section 4.

A summary of the interfaces between ECS and the GSFC DAAC (V0 or **DAS GDAAC** Data Link Server) is provided in Table 3-1. Also, a summary of the interfaces between ECS and the GSFC DAAC (**DAS GDAAC** Data Link Server), specifically at Release B, is provided in Table 3-2. In particular, these tables identify the source, destination, interface message, data, and transfer mechanism.

Table 3-1. ECS to GSFC DAAC (V0 or **DAS GDAAC Data Link Server) Interfaces**

Source	Destination	Interface Message	Data	Transfer Mechanism
GSFC DAAC (DAS GDAAC Data Link Server)	ECS	Product Delivery Record	N/A	ftp
ECS	GSFC DAAC (DAS GDAAC Data Link Server)	Product Delivery Record Discrepancy	N/A	e-mail (see Note 1)
GSFC DAAC (DAS GDAAC Data Link Server)	ECS	N/A	(NCEP Data): Final Analysis and Forecast System-Global Analysis (FNL)	ftp
GSFC DAAC (DAS GDAAC Data Link Server)	ECS	N/A	(NCEP Data): Medium Range Forecast System-Forecast at 00Z (MRF)	ftp
GSFC DAAC (DAS GDAAC Data Link Server)	ECS	N/A	NCEP Surface Flux Data	ftp
GSFC DAAC (DAS GDAAC Data Link Server)	ECS	N/A	T62 Spectral Coefficients (Sigma Product)	ftp
GSFC DAAC (DAS GDAAC Data Link Server)	ECS	N/A	CAMS Raingauge Analysis	ftp
GSFC DAAC (DAS GDAAC Data Link Server)	ECS	N/A	GPI Merged IR	ftp
ECS	GSFC DAAC (DAS GDAAC Data Link Server)	Production Acceptance Notification	N/A	e-mail
GSFC DAAC (V0 System)	ECS	Product Delivery Record	N/A	ftp

ECS	GSFC DAAC (V0 System)	Product Delivery Record Discrepancy	N/A	e-mail (see Note 1)
GSFC DAAC (V0 System)	ECS	N/A	(TOMS Ozone Data): ---Nimbus 7 Satellite Data	ftp
GSFC DAAC (V0 System)	ECS	N/A	(TOMS Ozone Data): ---Meteor-3/TOMS Data	ftp
GSFC DAAC (V0 System)	ECS	N/A	(TOMS Ozone Data): ---EP/TOMS Data	ftp
GSFC DAAC (V0 System)	ECS	N/A	(TOMS Ozone Data): ---ADEOS/TOMS Data	ftp
ECS	GSFC DAAC (V0 System)	Production Acceptance Notification	N/A	e-mail

Note 1: This e-mail message is used only in the event of an error in the product delivery record.

Table 3-2. ECS to GSFC DAAC (V0 or ~~DAS~~ GDAAC Data Link Server) Interfaces
(Release B)

Source	Destination	Interface Message	Data	Transfer Mechanism
GSFC DAAC (DAS <u>GDAAC</u> Data Link Server)	ECS	Product Delivery Record	N/A	ftp
ECS	GSFC DAAC (DAS <u>GDAAC</u> Data Link Server)	Product Delivery Record Discrepancy	N/A	e-mail (see Note 1)
GSFC DAAC (DAS <u>GDAAC</u> Data Link Server)	ECS	N/A	NCEP Ship/Buoy Observations	ftp
GSFC DAAC (DAS <u>GDAAC</u> Data Link Server)	ECS	N/A	NCEP Reynolds Blended SST Product	ftp
GSFC DAAC (DAS <u>GDAAC</u> Data Link Server)	ECS	N/A	NCEP Aviation Analysis	ftp
ECS	GSFC DAAC (DAS <u>GDAAC</u> Data Link Server)	Production Acceptance Notification	N/A	e-mail

Note 1: This e-mail message is used only in the event of an error in the product delivery record.

~~Figure 3-1. Interfaces to ECS at GSFC DAAC-Context Diagram (Release A)~~



Figure 3-1. Interfaces to ECS at GSFC DAAC-Context Diagram (Release A)

~~**Figure 3-2. Interfaces to ECS at GSFC DAAC-Context Diagram (Release B)**~~

Figure 3-2. Interfaces to ECS at GSFC DAAC-Context Diagram (Release B)

4. Data Exchange Framework

This section addresses the applicable internetworking protocols and network topologies involved in the electronic dissemination of NCEP ancillary data from the ~~DAS~~ GDAAC Data Link Server (currently named "larry") to ECS, and Total Ozone Mapping Spectrometer (TOMS) Ozone Data from the V0 System to ECS at the GSFC DAAC. Furthermore, polling with product delivery record, data transfer, state diagrams, and data exchange security are addressed herein.

In addition to pertaining to ancillary data, Sections 4.1 and 4.2 apply to the following internetworking interfaces:

- Internetworking between ECS and the GSFC Campus via external networks
- Internetworking for V0-to-V1 static data migration
- Internetworking for V0/ECS interoperability

4.1 Internetworking Protocols and Network Topology

ECS provides internetworking services that are based on protocols and standards corresponding to layers 1 through 4 of the Open Systems Interconnection (OSI) Reference Model, specified in RFC 1510--these include, respectively, the physical, datalink, network, and transport layers. The transport layer protocol provides data consistency functions. The network, datalink and physical layers play significant roles in defining external interfaces (i.e., between ECS and non-ECS networks/systems). In particular, ECS routers provide the physical demarcation points between ECS networks and external networks/systems--the routing software (resident within routers) provides network layer services, while the interfaces on the router make up the datalink/physical layers.

4.1.1 Transport Layer Protocol

The transport layer protocol used for communications between ECS processes and non-ECS processes at the GSFC DAAC is the Transmission Control Protocol (TCP) specified in RFC 793. TCP is a connection-oriented, end-to-end reliable protocol designed to fit into a layered hierarchy of protocols which support multi-network applications. It provides for reliable inter-process communication between pairs of processes in host computers attached to networks within and outside of ECS.

The interface between TCP and an application process consists of a set of calls much like the calls an operating system provides to an application process for manipulating files. For example, there are calls to open and close connections and to send and receive data on established connections. TCP can also asynchronously communicate with application programs such as those based on Distributed Computing Environment (DCE).

4.1.2 Network Layer Protocols

The network layer provides the functional and procedural means to exchange network data units (i.e., packets) between devices over network connections, both for connection-mode and connectionless-mode communications. It relieves the transport layer of any concern regarding routing and relay operations associated with network connection. The basic function of the network layer is to provide the transparent transfer of data between devices. It should be noted that the network layer delivers packets only to a device, not an individual process--it remains up to the transport layer protocol to include, beforehand, the additional information needed to permit addressing to an individual process. Network layer protocols supported by ECS networks include Internet Protocol (IP) plus various routing protocols.

4.1.2.1 Internet Protocol (IP)

The Internet Protocol (IP), specified in RFC 791 is the network protocol that ECS supports, based on its dominance in industry usage and wide-community support. As part of IP support, Internet Control Message Protocol (ICMP) and Address Resolution Protocol (ARP) are also supported. As the Internet Engineering Task Force (IETF)-specified new generation IP becomes available for deployment, it will be supported by ECS networks.

4.1.2.2 Routing

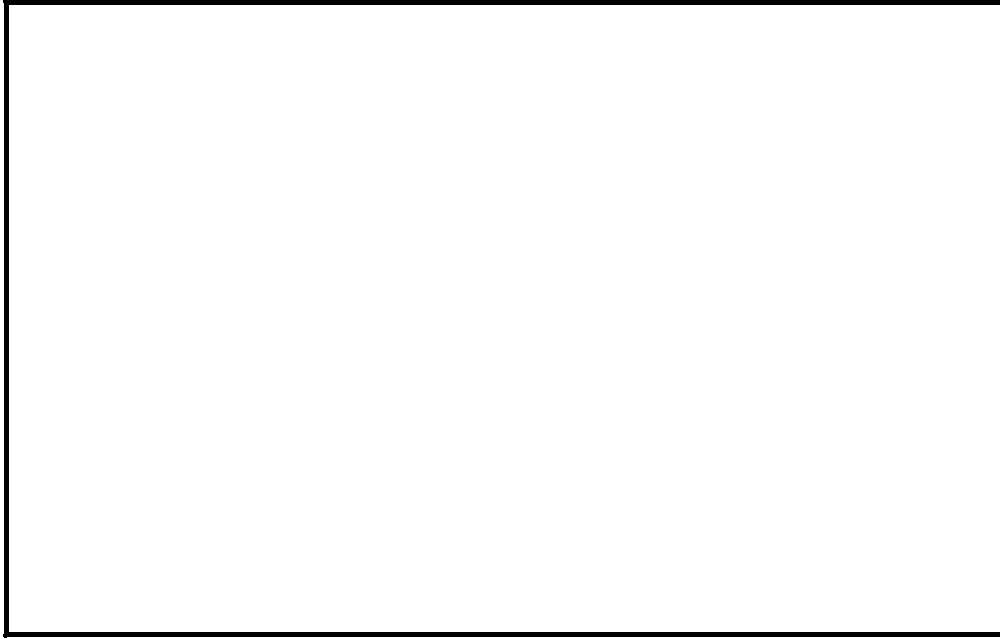
ECS generally uses Routing Information Protocol (RIP) for route exchanges with external networks. Other more robust routing protocols such as Border Gateway Protocol (BGP-4) can also be used depending on the need and center routing policies. The specific routing implementation at GSFC is specified in the EBnet Distributed Active Archive Center ~~(DAAC)æICD~~ [\(DAAC\) ICD](#).

4.1.3 Physical/Datalink Layer Protocols

At the GSFC DAAC the interface to the V0 DAAC LAN is via FDDI, and is implemented by a FDDI connection into an ECS DAAC router. The interface between the ECS DAAC router and other networks is specified in the EBnet Distributed Active Archive Center (DAAC) ICD.

4.1.4 Network Topology

The V0 DAAC LAN is attached to the ECS DAAC Router via an FDDI connection as depicted in Figure 4-1. The interface between the ECS GSFC DAAC and other networks is currently specified in the EBnet Distributed Active Archive Center (DAAC) ICD.



***Figure 4-1. Network Interfaces Between ECS, V0, DAS Datalink Server,
and Campus at GSFC***

**Figure 4-1. Network Interfaces Between ECS, V0, GDAAC Datalink Server,
and Campus at GSFC**

4.2 Communications Protocols

ECS provides various communications services that are based on protocols and standards corresponding to the applications level of the Open Systems Interconnection (OSI) Reference Model. Two of these services include the Simple Mail Transport Protocol (SMTP) and File Transfer Protocol (FTP).

4.2.1 Simple Mail Transport Protocol

All electronic mail (e-mail) message exchange is achieved through the use of Internet e-mail messages. The protocol for Internet e-mail transfer is the Simple Mail Transfer Protocol (SMTP) defined in RFC 821.

4.2.2 File Transfer Protocol

File transfers between ECS and the V0 System host computers are accomplished through the use of standard File Transfer Protocol (FTP). FTP, as described in RFC 959, is an internet standard for file transfers that support downloading of files, by a user (acting as a client), from a remote server.

4.3 Polling With Product Delivery Record and Data Transfer

This section addresses the polling with product delivery record data transfer mechanism, error conditions, error handling/backup methods, and physical media.

4.3.1 Data Transfer

A "Polling With Product Delivery Record (PDR)" transfer mechanism is used by the ECS Ingest Subsystem to acquire NCEP ancillary data from the ~~DAS~~ GDAAC Data Link Server/larry, and TOMS Ozone ancillary data from the V0 System at the GSFC DAAC. The ECS side of the interface is equipped with an FTP daemon---a computer program which invokes this data transfer mechanism. Specifically, the daemon:

- Automatically, and with operator-tunable periodicity, polls the server supplying the data (i.e., ~~DAS~~ GDAAC Data Link Server/larry, or V0 System)
- Detects a PDR file in the GSFC DAAC-designated directory via an FTP ~~"ls"~~ "ls" command--i.e., gets a directory listing from a remote server.
- Acquires the PDR file information via an FTP "get" command--i.e., initiates a single file transfer from a remote server to a local host/workstation.

On the GSFC DAAC side of the interface (i.e., ~~DAS~~ GDAAC Data Link Server/larry, or V0 System) an FTP daemon continually listens for incoming FTP requests, acts on each arriving FTP request, and routes each FTP request to the appropriate account, making the directory subtree available to ECS with the allowable privileges.

Once a PDR has been detected/acquired by ECS, the PDR is validated. In the event that the PDR is invalid, ECS automatically returns a Product Delivery Record Discrepancy (PDRD) via e-mail to the supplier system (i.e., V0 or ~~DAS~~ GDAAC Data Link Server). If the PDR is valid, ECS schedules to pull the ancillary data using an FTP ~~"get"~~ "get" command; in this case no PDRD is sent. If the entire PDR is determined to be invalid, as reflected in a corresponding PDRD, none of its file groups is processed and none of the files is transferred by ECS. The PDR must be corrected and resubmitted. If a PDR contains multiple file groups for which one or more file groups contain errors, the file groups with errors are not processed. However, the file groups without errors are processed by ECS. The specific ancillary data sets transferred from the supplier system (i.e., V0 or ~~DAS~~ GDAAC Data Link Server) to ECS are identified in Section 5. After the ingest/archive process, ECS automatically returns a "Production Acceptance Notification (PAN)" via e-mail to the supplier system indicating success/failure, including detected errors. This data transfer mechanism is depicted in Figure 4-2. The definitions of the

PDR, PDRD, and PAN are described in the paragraphs which follow. Operator tunable parameters for message (e.g., PDR, PDRD and PAN) transfer include the following:

- Time the supplier system waits to receive a PDRD (or PAN) before placing another PDR in the directory.
- Expiration time---i.e., the elapsed time between the placement of a PDR in the directory by the supplier system, and the deletion of the data from the file server by the supplier system.

All relevant operator tunable parameters will be documented in the operations procedures for the GSFC DAAC-Unique Systems and ECS, as an integral part of the DAAC Operations Manual (DID 611).

***~~Figure 4-2. Polling With Product Delivery Record and Data Transfer
at the GSFC DAAC~~***

**Figure 4-2. Polling With Product Delivery Record and Data Transfer
at the GSFC DAAC**

4.3.2 Product Delivery Record

The purpose of the PDR is to announce the availability of ancillary data granules for transfer, including file names, location, and how long these granules will be available in that location. The PDR is generated and placed in an operator configurable (pre-specified) directory (e.g., in the ftp\pub\drstats) directory ~~(on an operator configurable server (e.g., eosdata) the "eosdata" machine)~~ by the system supplying the data (i.e., the ~~DAS~~ GDAAC Data Link Server/larry, or the V0 System) after the data files referenced in the PDR have been placed into their respective directories. ECS polls the system supplying the data, detects/acquires/validates the PDR, and schedules to pull the ancillary data.

The PDR format is comprised of a message header followed by a Standard Format Data Unit (SFDU) which consists of an Exchange Data Unit (EDU) label, a PDR Label, and Parameter-

Value Language (PVL) Statements. This message structure is depicted in Figure 4-3. The detailed format for the message header and SFDU labels are defined in Table 4-1. The required PDR PVL parameters are depicted in Table 4-2. The PDR PVL statements are ASCII strings, having at most 256 characters, in the form: "Parameter = Value." The Value strings shown in Table 4-2 include pre-defined values shown by single quote marks and processor determined values. Processor determined values include ASCII strings, ISO times, and integers to be filled in with appropriate values by a V0 or ~~DAS~~ GDAAC Data Link processor during PDR creation. A sample PDR PVL is provided in Figure 4-4. The maximum allowed message length for a PDR is 1 megabyte. PDRs are validated to check that all required fields contain valid values and that the format of the PDR is correct and consistent with the standards. PDRs that adhere to the defined message standards shown in Tables 4-1 and 4-2 are accepted and processed. Unique file names are assigned to each PDR using the following convention:

FILENAME = xxxx.epochal_time.PDR

where

epochal time = time returned by the system function, measured in elapsed seconds since Jan 1, 1970)---10 bytes are allocated

and

xxxx = TOMS, or NCEP (i.e., related to the dataset)

[For example, FILENAME = NCEP.0013589462.PDR, or TOMS.0313575892.PDR]

Additional information on SFDU and PVL can be found in the following documents:

- Consultative ~~Consultative~~ Committee for Space Data Systems (CCSDS), Standard Formatted Data Units -- Structure and Construction Rules, Blue Book
- Consultative ~~Consultative~~ Committee for Space Data Systems (CCSDS), Parameter Value Language Specification (CCSD0006), Blue Book

4.3.3 Product Delivery Record Discrepancy

The PDRD is sent by ECS to the supplier system (i.e., V0 or ~~DAS~~ GDAAC Data Link Server), via automatic e-mail, only in the event that the PDR cannot be successfully validated. The PDRD identifies any errors or problems that have been encountered. There are two forms of PDRD, including a short form (Table 4-3) and long form (Table 4-4). The short form is used for PDRs with header and label errors. The long form is used when some file groups in the PDR have invalid parameters. The PDRD consists of PVL Statements. Short and long PDRD PVL examples are provided, respectively, in Figure 4-5 and Figure 4-6. Unique e-mail names are assigned to each PDRD using the following convention:

FILENAME = xxxx.epochal_time.PDRD

where,

epochal time = time returned by the system function, measured in elapsed seconds since Jan 1, 1970)---10 bytes are allocated

and,

xxxx = TOMS, or NCEP (i.e., related to the dataset)

For example, NCEP.0013589462.PDRD, or TOMS.0313575892.PDRD

4.3.4 Production Acceptance Notification

After the data have been ingested/archived by ECS, ECS automatically sends a “Production Acceptance Notification (PAN)” via e-mail to the supplier system (i.e., V0 or ~~DAS~~ [GDAAC](#) Data Link Server). The PAN file announces the completion of data transfer and archival, and identifies any errors or problems that have been encountered. There are two forms of the PAN available for use, including a short (Table 4-5) and a long (Table 4-6) form. The short form of the PAN is [sent to acknowledge a successful data transfer or to indicate an error that affects all files defined in the PDR.](#) ~~used for error-free transfers and mainly communication-related errors.~~ If all files in a request do not have the same disposition, a long form of this message is employed. The PAN consists of PVL Statements. Short and long PAN PVL examples are provided, respectively, in Figure 4-7 and Figure 4-8. Unique e-mail names are assigned to each PAN. The file naming convention is as follows:

FILENAME = xxxx.epochal_time.PAN

where,

epochal time = time returned by the system function, measured in elapsed seconds since Jan 1, 1970)---10 bytes are allocated

and,

xxxx = TOMS, or NCEP (i.e., related to the dataset)

For example, NCEP.0013589462.PDRD, or TOMS.0313575892.PAN

Figure 4-3. Message Structure of Product Delivery Record**Table 4-1. PDR Message Header, and EDU and PDR Labels**

Field	Description	Type (Length in Bytes)	Value/Range
Message Type	Indicates PDR	Unsigned Integer (1B)	2
Message Length	Length of Message in bytes	Unsigned Integer (3B)	1,048,576
Exchange Data Unit Label	Not Used	ASCII (20 B)	20 byte fill
PDR Label	Not Used	ASCII (20 B)	20 byte fill

Table 4-2. Required Product Delivery Record PVL Parameters

Parameter	Description	Type/Format (Max/Length in Bytes)	Value
ORIGINATING_SYSTEM	Originator of Product Delivery Record	Variable String/ ASCII (20 B)	V0 or DAS GDAAC Data LinkServer identifier (Concise, unique name representing external interface; e.g., OV00 " V0 ")
TOTAL_FILE_COUNT	Total number of files to transfer	Unsigned Integer/ ASCII (4 B)	1- 9999
EXPIRATION_TIME	ISO Time for data deletion from originating system. This time is set by the GSFC DAAC based on available resources.	Fixed String/ ASCII (20B)	yyyy-mm-ddThh:mm:ssZ, where T indicates the start of time information and Z indicates "Zulu" time and Z are literals
OBJECT	Start of file group parameters (repeat for each group of files)	Fixed String/ ASCII (10B)	'FILE_GROUP'
DATA_TYPE	ECS Data Type	Variable String/ ASCII (20 B)	Valid ECS Data Type, as listed in Tables 5-1 and 5-2.
NODE_NAME	Name of network node on which the file resides	Variable String/ ASCII (64 B)	e.g., 'servername.gsfc.nasa.gov'
OBJECT	Start of file parameters (repeat for each file in file group)	Fixed String/ ASCII (9B)	'FILE_SPEC'
DIRECTORY_ID	File directory name (i.e., path name)	Variable String/ ASCII (256 B) (See Note 1)	e.g., /NCEP/GROUP1/
FILE_ID	File name	Variable String/ ASCII (256 B) (See Note 1)	file name
FILE_TYPE	File data type	Variable String/ ASCII (20 B)	e.g., Metadata, Science data, Browse, etc.
FILE_SIZE	Length of file in bytes	Unsigned 32-bit Integer/ASCII (10 B)	< 4.296 2 *10 ⁹
END_OBJECT	End of file parameters (repeat for each file)	Fixed String/ ASCII (9 B)	'FILE_SPEC'
END_OBJECT	End of file group (repeat for each group of files)	Fixed String/ ASCII (10 B)	'FILE_GROUP'

Note 1. Size can vary up to 256 bytes total when DIRECTORY_ID is combined with FILE_ID

<pre> ORIGINATING_SYSTEM = V0_1; TOTAL_FILE_COUNT = 68 EXPIRATION_TIME = 1998-06-18T14:00:00Z; OBJECT = FILE_GROUP; DATA_TYPE = NCEP01; NODE_NAME = servername.gsfc.nasa.gov; OBJECT = FILE_SPEC; DIRECTORY_ID = /NCEP/GROUP1/; FILE_ID = FNL.CED1.GAN1.981125.06Z; <u>FILE_TYPE = Science Data;</u> FILE_SIZE = 7500000; END_OBJECT = FILE_SPEC; OBJECT = FILE_SPEC; DIRECTORY_ID = /NCEP/GROUP1/; FILE_ID = FNL.CED1.META1.981125.06Z; <u>FILE_TYPE = Metadata;</u> FILE_SIZE = 10000; END_OBJECT = FILE_SPEC; ----- /* Repeat FILE_SPEC objects for each DAS <u>GDAAC</u> data file within file group */ ----- END_OBJECT = FILE_GROUP; ----- /* Repeat FILE_GROUP objects for each different file group */ ----- </pre>	EXAMPLE ONLY
	EXAMPLE ONLY

Figure 4-4. Example PDR PVL

Table 4-3. Short Product Delivery Record Discrepancy PVL Parameters

Parameter ²	Description	Type/Format (Length in Bytes)	Value ²
MESSAGE_TYPE	Short Product Delivery Record Discrepancy	<u>Unsigned Integer/ASCII (1)</u> <u>Fixed String/ASCII (10)</u>	2- <u>Short PDRD</u>
DISPOSITION	Disposition of Ingest Request ¹	Variable String/ASCII (64)	invalid-mission-ID invalid file count other-errors <u>ECS</u> <u>internal error</u> invalid-PDR-length invalid-aggregate-length database failures invalid-expiration-date invalid PVL statement no-data-provider <u>Missing</u> <u>ORIGINATING_SYSTEM</u> parameter data provider request threshold exceeded data provider volume threshold exceeded system request threshold exceeded system volume threshold exceeded

Note 1: In any given instance, only one disposition value is provided. In cases where multiple errors have occurred, the disposition value corresponding to the first error encountered will be provided.

Note 2: Each parameter/value is followed by an EOL mark.

Table 4-4. Long Product Delivery Record Discrepancy PVL Parameters

Parameter ²	Description	Type/Format (Length in Bytes)	Value ²
MESSAGE_TYPE	Long Product Delivery Record Discrepancy	<u>Unsigned Integer/ASCII (1)</u> <u>Fixed String/ASCII (9)</u>	3- <u>Long PDRD</u>
NO_FILE_GRP (to follow)	Number of File Groups with Errors	Integer/ASCII (4)	Number of File groups, in PDR, with errors

For each file group having errors in the PDR

DATA_TYPE	ECS Data Type	ASCII String (20)	DATA_TYPE in PDR
DISPOSITION	Disposition of Ingest Request ¹	Variable String/ASCII (64)	invalid-data-version invalid data type* invalid directory* invalid file size invalid-time/date-format invalid short file ID* invalid node name* invalid file type*

Note 1: In any given instance, only one disposition value may be provided. In cases where multiple errors have occurred, the disposition value corresponding to the first error encountered will be provided.

Note 2: Each parameter/value statement is followed by an EOL mark.

* Null string check only

MESSAGE_TYPE = 2 Short PDRD ; DISPOSITION = DATABASE FAILURES;	EXAMPLE ONLY
--	---------------------

Figure 4-5. Example Short PDRD PVL

MESSAGE_TYPE = 3 Long PDRD ; NO_FILE_GRPS = 2; DATA_TYPE = NCEP01; DISPOSITION = INVALID DATA TYPE; DATA_TYPE = NCEP02; DISPOSITION = INVALID SHORT FILE ID;	EXAMPLE ONLY
--	---------------------

Figure 4-6. Example Long PDRD PVL**Table 4-5. Short Production Acceptance Notification PVL Parameters**

Parameter ²	Description	Type/Format (Length in Bytes)	Value ²
MESSAGE_TYPE	Short Production Acceptance Notification Definition	Unsigned Integer/ASCII (1) Fixed String/ASCII (9)	2 Short PAN
DISPOSITION	Disposition of Ingest Request ¹	Variable String/ASCII (64)	Successful Network Failure Unable to Establish FTP Connection Host Denied Access All File Groups/Files not found FTP failure --Too many errors in file transfer Post-transfer double-check failed FTP command error failed to add file to the preprocess list ECS internal error failed to get needed data from PDR Class construction failed File transfer failed Request Canceled Metadata preprocessing error Resource allocation failure Recovery Failure Data base access error Incorrect number of metadata files Incorrect number of science files Incorrect number of files Data conversion failure Metadata checking failure Unknown data type invalid or missing file type File I/O error Data archive error

TIME_STAMP	ISO Time when Destination System completed data transfer and validation transferred the last part of data	ASCII (20)	yyyy-mm-ddThh:mm:ssZ, where T <u>indicates the start of time information and Z indicates "Zulu" time</u> and Z are literals
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Note 1: In any given instance, only one disposition value may be provided. In cases where multiple errors have occurred, the disposition value corresponding to the first error encountered will be provided.

Note 2: Each parameter/value statement is followed by an EOL mark.

Table 4-6. Long Production Acceptance Notification PVL Parameters

Parameter ²	Description	Type/Format (Length in Bytes)	Value ²
MESSAGE_TYPE	Long Production Acceptance Notification	Unsigned Integer/ASCII (1) <u>Fixed String/ASCII (8)</u>	12- <u>Long PAN</u>
NO_OF_FILES	Number of Files in PDR	ASCII (4)	TOTAL_FILE_COUNT parameter in PDR

For each File in the PDR

FILE_DIRECTORY	ASCII string specifying file directory location	ASCII (<256) Equivalent to PDR length	DIRECTORY_ID parameter in PDR
FILE_NAME	File names on system creating PDR	ASCII (<256) Equivalent to PDR length	FILE_ID parameter in PDR
DISPOSITION	Disposition of Ingest Request ¹	Variable String/ASCII (64)	Successful Network Failure Unable to Establish FTP Connection Host Denied Access All File Groups/Files not found FTP failure - Too many errors in file transfer Post-transfer double-check failed FTP command error failed to add file to the preprocess list- <u>ECS</u> <u>internal error</u> failed to get needed data from PDR Class construction failed File transfer failed Request Canceled Metadata preprocessing error Resource allocation failure Recovery Failure Data base access error Incorrect number of metadata files Incorrect number of science files Incorrect number of files Data conversion failure Metadata checking failure Unknown data type invalid or missing file type File I/O error Data archive error
TIME_STAMP	ISO Time when Destination System transferred the last part of the data	ASCII (20)	yyyy-mm-ddThh:mm:ssZ, where T <u>indicates the start of time information</u> and Z indicates "Zulu" time <u>and Z are literals</u>

Note 1: In any given instance, only one disposition value may be provided. In cases where multiple errors have occurred, the disposition value corresponding to the first error encountered will be provided.

Note 2: Each parameter/value statement is followed by an EOL mark.

MESSAGE_TYPE = 2- <u>Short PAN</u> ;	EXAMPLE ONLY
DISPOSITION = INCORRECT NUMBER OF METADATA FILES;	
TIME_STAMP = 1996-06-23T09:46:35Z;	

Figure 4-7. Example Short PAN PVL

MESSAGE_TYPE = 12 <u>Long PAN</u> ;	EXAMPLE ONLY
NO_OF_FILES = 3;	
FILE_DIRECTORY = NCEP/GROUP1;	
FILE_NAME = FNL.CED1.GAN1.981125.06Z;	
DISPOSITION = UNABLE TO ESTABLISH FTP CONNECTION;	
TIME_STAMP = 1996-04-28T234959Z;	
FILE_DIRECTORY = NCEP/GROUP1;	
FILE_NAME = MRF.CED1fHHH.YYMMDDD.00Z;	
DISPOSITION = DATABASE ACCESS ERROR;	
TIME_STAMP = 1996-11-28T21:39:49Z;	
FILE_DIRECTORY = NCEP/GROUP1;	
FILE_NAME = SFCYYMMDD.HHZ;	
DISPOSITION = INCORRECT NUMBER OF SCIENCE FILES;	
TIME_STAMP = 1996-09-16T15:45:52Z;	
	EXAMPLE ONLY

Figure 4-8. Example Long PAN PVL

4.3.5 Error Conditions

During the course of data exchange via FTP, the following error conditions may arise:

- Failure to establish TCP/IP connection
- Erroneous FTP command
- File not found (listed in PDR, but not found on disk)
- File not readable due to permissions

4.3.6 Error Handling/Backup Methods

Should a problem develop during an FTP file transfer due to any of the above error conditions, an operator-tunable number of attempts are made to pull the data. In the event that problems cannot be resolved within this operator-tunable number of attempts, ECS and the ~~DAS~~ GDAAC Data Link Server (or V0 System) operations personnel have the option to coordinate data delivery on approved high density storage media (see Section 4.3.7). While the use of tape media as a backup is not a requirement, it may be useful during emergencies, and is supported by ECS, the ~~DAS~~ GDAAC Data Link Server, and the V0 System .

In the event that tape media is used during emergencies, a separate Physical Media Product Delivery Record (PMPDR) file must be supplied for each piece of media delivered to ECS. The PMPDR must, both, be contained as a file on the media and be available separately as hard copy- in the event that a file check on the media by ECS reveals that the PMPDR is missing, DAAC operations personnel will supply ECS operations personnel with a hardcopy PMPDR. The

format and information content for the PMPDR is the same as that for the PDR defined in Tables 4-1 and 4-2 (excluding EXPIRATION_TIME).

4.3.7 Physical Media

A variety of approved high density storage media will be available for providing backup during data transfer including the following:

- a. 8 mm tape [112 meters; 5GB standard capacity]
- b. 4 mm digital audio tape (DAT) [90 meters; 2GB standard capacity]

Data are distributed uncompressed. The blocking factor is 127. The TAR tape format is supported. Paper labels for each tape identify the names of files contained on the tape, and the order in which these files have been written.

4.4 State Diagrams

This section specifies the state machine representations for the V0 System and ECS at the GSFC DAAC. State machines are depicted using a state diagram based on the following standardized conventions, as depicted in the example in Figure 4-9:

- States are represented by labeled vertical bars
- Transitions from one state to another are represented by horizontal arrows which connect the source and destination states.
- Events (message receipt/time-outs) and conditions that trigger a transition appear above the arrow.
- Actions performed when the transition occurs are shown below the arrow.
- Once in a state, the system will remain there until a condition transition is true.

4.4.1 V0 and **DAS GDAAC** Data Link Server State Diagram

This section describes the interaction between the system providing the data (i.e., V0 System or **DAS GDAAC** Data Link Server/larry) and ECS, from the standpoint of the supplier system, with respect to the retrieval of any given ancillary data product from the supplier system. This interaction is depicted in Figure 4-10 in the form of a state diagram. The PDR and data are transferred using standard FTP communications. The following states are discussed in this section:

- Data Not Available
- Wait Until Expiration Time is Exceeded
- Error(s)
- Done

~~Figure 4-9. Example Depicting Standard Conventions for State Diagrams~~

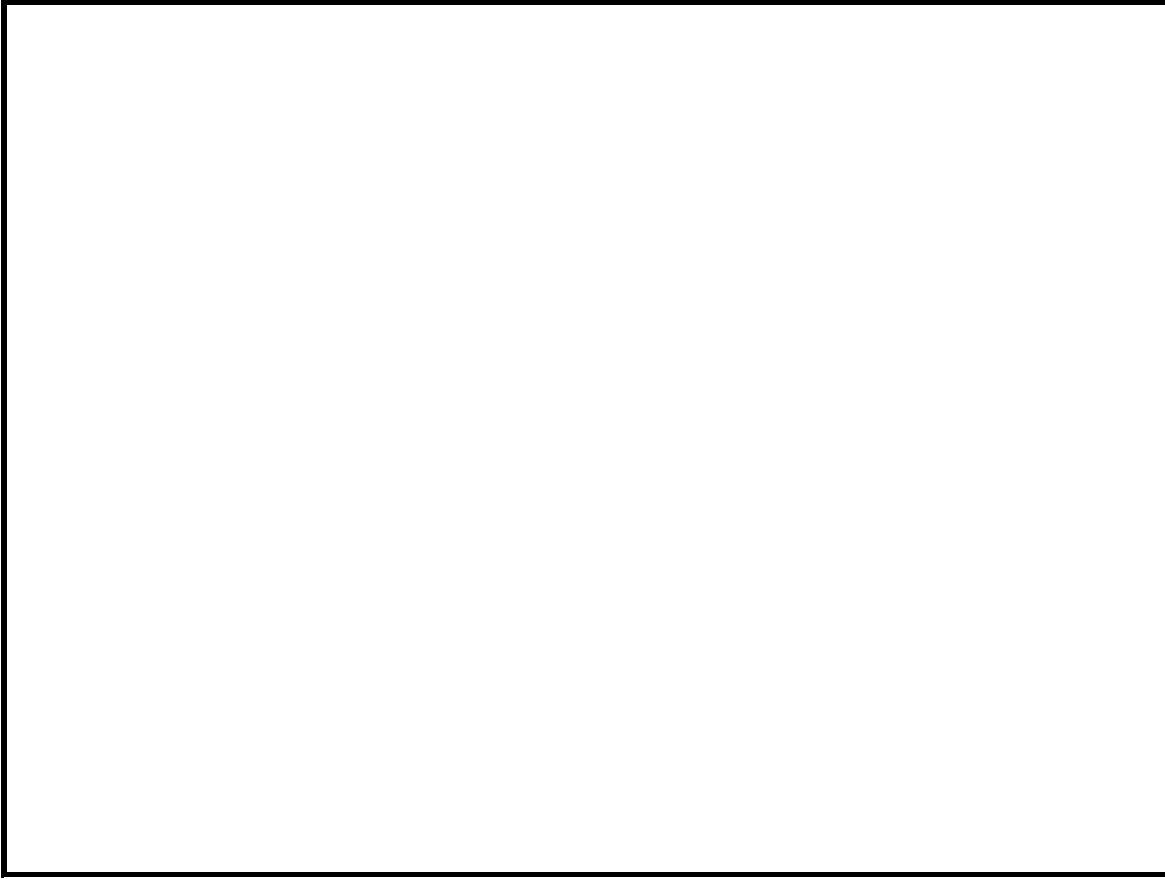


Figure 4-9. Example Depicting Standard Conventions for State Diagrams

Figure 4-10. V0 and ~~DAS~~ GDAAC Data Link Server State Diagram at GSFC DAAC

4.4.1.1 Data Not Available

In this state, the supplier system (i.e., V0 or ~~DAS~~ GDAAC Data Link Server) is waiting for the data product to become available for distribution. A product could become available routinely on receipt from a source system or on demand in response to a special request. When the data product becomes available, the supplier system places a PDR (which identifies expiration time after which data can be deleted, etc.) in the designated local directory, and transitions to the "Wait Until Expiration Time is Exceeded" state.

4.4.1.2 Wait Until Expiration Time is Exceeded

In the "Wait Until Expiration Time is Exceeded" State, the supplier system (i.e., V0 or ~~DAS~~ GDAAC Data Link Server) is waiting for the expiration time (defined in the PDR) to be exceeded, after which data can be deleted from the local host. The following events/conditions, actions and transitions may occur while the supplier system is in this particular state:

- If a failure occurs in this state such that the data product cannot be accessed on the data host as specified in the PDR, the supplier system (i.e., V0 or ~~DAS~~ GDAAC Data Link Server) transitions to the ~~Error(s)~~ "Error(s)" State.
- When the expiration time has been exceeded the supplier system (i.e., V0 or ~~DAS~~ GDAAC Data Link Server) transitions to the "Done" state.

4.4.1.3 Error(s)

In the "Error(s)" State, error handling operations are carried out by GSFC DAAC (~~DAS~~ GDAAC Data Link Server or V0 System) operator. While the supplier system is in this particular state, the operator terminates the process, and all of the scheduled supplier system state transitions.

4.4.1.4 Done

The "Done" State indicates that the expiration time has been exceeded without any evidence of a data host failure.

4.4.2 ECS State Diagram

This section describes the interaction between the supplier system (i.e., V0 or ~~DAS~~ GDAAC Data Link Server) and ECS, from the ECS standpoint, with respect to the retrieval of any given ancillary data product from the supplier system. This interaction is depicted in Figure 4-11 in the form of an ECS State Diagram. The PDR and data are transferred using FTP communications.

The following states are discussed in this section:

- PDR Not Detected
- Transfer PDR
- Await PDR Validation

- Transfer Data
- Error(s)

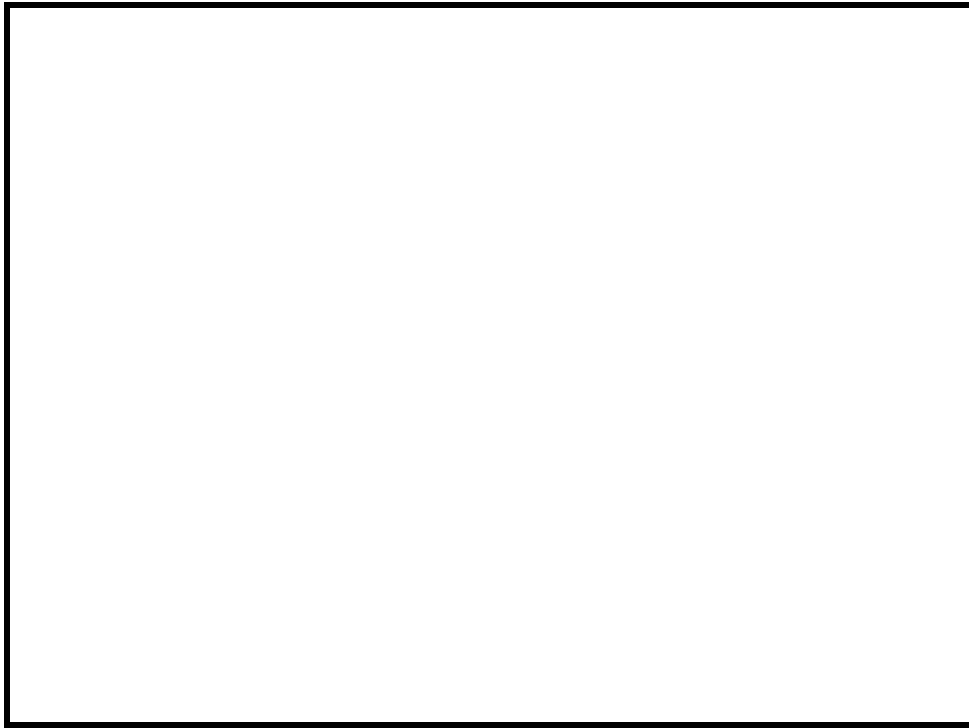


Figure 4-11. ECS State Diagram at GSFC DAAC

4.4.2.1 PDR Not Detected

In this state, ECS is periodically polling to detect the presence of a PDR on the supplier side of the interface. When a PDR is detected, ECS initiates the transfer and transitions to the “Transfer PDR” state.

4.4.2.2 Transfer PDR

While in this state, ECS is executing file transfers to acquire the detected PDR. After the transfer of the PDR is successfully completed ECS will set a time-out and transition to the ~~“Await PDR Validation”~~ “Await PDR Validation” state.

4.4.2.3 Await PDR Validation

While in this state, ECS is waiting for validation of the PDR to be completed and for resources to become available. The following events/conditions, actions and transitions may occur while ECS is in this particular state:

- If the PDR is valid, ECS transfers the PDR (provided that resources are available) and transitions to the ~~“Transfer Data”~~ “Transfer Data” state.

- If the PDR is invalid, ECS notifies the operator and transitions to the ~~“Error(s)”~~ state.

It should be noted that for the sake of simplicity, the occurrence of invalid PDRs is not depicted in other states. Whenever an invalid PDR is identified, ECS notifies the operator and transitions to the “Error(s)” state.

4.4.2.4 Transfer Data

While in this state, ECS is executing file transfers to acquire the data. Once the transfer of data is successfully completed, ECS transitions to the ~~“Done”~~ “Done” state.

4.4.2.5 Error(s)

In the “Error(s)” State, ECS is waiting for error handling to be executed by the ECS/supplier system operators. While ECS is in this particular state, the operator terminates the process, and ECS transitions to the ~~“Done”~~ state.

4.4.2.6 Done

The “Done” State terminates the process and occurs when ECS has successfully retrieved all of the data files.

4.5 Data Exchange Security

Ancillary data transfer from the provider (i.e., ~~DAS~~ GDAAC Data Link Server or V0 System) is initiated by ECS via FTP "get" commands (see Tables 5-1, 5-2, and 5-3 for specific data sets). Security is provided via basic password authentication during login.

5. Data Flow Descriptions

The ECS-to-~~DAS~~ GDAAC Data Link Server data flows, as well as the ECS-to-V0 System data flows are addressed in this section. At the GSFC DAAC, the following interfaces provide ancillary data to ECS to support TSDIS and ECS standard product generation:

- The ~~DAS~~ GDAAC Data Link Server makes NCEP data available to ECS via hostname: larry.gsfc.nasa.gov.
- The V0 System makes TOMS Ozone Data available to ECS via hostname: jwocky.gsfc.nasa.gov

This section also identifies the minimum required metadata.

5.1 NCEP Ancillary Data Sets

This section identifies the NCEP ancillary data sets supplied by the ~~DAS~~ GDAAC Data Link Server to ECS at the GSFC DAAC, at Release A and Release B, and used by ECS to support TSDIS and ECS standard product generation.

5.1.1 NCEP Ancillary Data Sets (~~Release A~~)

The specific NCEP ancillary data sets provided by the ~~DAS~~ GDAAC Data Link Server, and used by ECS to support TSDIS and ECS standard product generation ~~at Release A~~ include the following: Final Analysis and Forecast System-Global Analysis (FNL), Medium Range Forecast System-Forecast at 00Z (MRF), NCEP Surface Flux Data, T62 Spectral Coefficients (Sigma Product), CAMS Raingauge Analysis, and GPI Merged IR. The product name, file name, frequency, file size, volume, format, and ECS Data Type (one of the required PDR PVL parameters which is used by the ECS Data Server--see Table 4-2) for each of these ancillary products are identified in Table 5-1. The file naming convention is explained as a footnote to this table.

5.1.2 NCEP Ancillary Data Sets (Release B)

The specific NCEP ancillary data sets provided by the ~~DAS~~ GDAAC Data Link Server, and used by ECS to support ECS standard product generation at Release B includes NCEP Ship/Buoy Observations, NCEP Reynolds Blended SST Product, and NCEP Aviation Analysis. The product name, file name, frequency, file size, volume, format and ECS Data Type (one of the required PDR PVL parameters which is used by the ECS Data Server--see Table 4-2) for each of these ancillary products is identified in Table 5-2.

Table 5-1. NCEP Ancillary Data Sets

Product Name	File Name	Frequency (files/day)	File Size ³ (MB/file)	Volume (MB/day)	Format	ECS Data Type
Final Analysis and Forecast System, Global Analysis (FNL)	fnl.ced1.gan1.YYMMDD.HHz (for HH = 00, 06, 12, 18) [See Note 1]	4	1	4	GRIB [See Note 4]	NCEP01 NMC FNL
Medium Range Forecast System, Forecast at 00Z (MRF)	mrf.ced1.fHHH.YYMMDD.00z (for HHH = 012 to 240 step 12) [See Note 2]	20	0.5	10	GRIB [See Note 4]	NCEP02
NCEP Surface Flux Data	TBD gdas1.ThhZ.SFLUX.GrbF06	TBD 4	TBD 4.1	TBD 16.4	GRIB [See Note 4]	NCEP03
T62 Spectral Coefficients (Sigma Product)	TBD gdas2.ThhZ.SAnl	TBD 4	TBD 1.9	TBD 7.6	GRIB [See Note 4]	NCEP04
CAMS Raingauge Analysis	TBD CAMS_gridded.yymm	TBD .033	TBD 2.1	.07	GRIB [See Note 4] binary	NCEP05 CAMS
GPI Merged IR	TBD gpi_estimate_yypp gpi_satid_yypp-yypp gpi_obs_yypp-yypp [See Note 5]	TBD .02 .02 .02	TBD .02 .02 .02	.133 .004 .004 .004	GRIB [See Note 4] binary	NCEP06 GPI

Note 1: 'fnl.ced1.gan1' is a literal defining the filename. YYMMDD is the date of product generation. HH is the hour of product generation, defined as 00, 06, 12 or 18. Suffix 'z' is a literal which stands for 'Zulu' time.

Note 2: 'mrf.ced1.f' is a literal defining the filename. HHH is the number of hours ahead for which the forecast applies (relative to the product generation time), defined as 012, 024, ..., 240. YYMMDD is the date of product generation. 00 indicates that the product generation time is t=0. Suffix 'z' is a literal which stands for 'Zulu' time.

Note 3: Data are distributed uncompressed

Note 4: GRIB format for NCEP gridded data sets documented in NOAA ON388.

Note 5: 'yypp-yypp' indicates the year and pentad number range, e.g., 8601-8605 indicates 1 through 5 in 1986. Suppose, for example, the filename is [gpi_estimate_0701](#). Theoretically this might indicate pentad 1 in either 1907 or 2007--by convention (and to avoid confusion) only that data from the time-closer year (i.e., 2007, not 1907) will be indicated.

Table 5-2. NCEP Ancillary Data Sets (Release B)

Product Name	File Name	Frequency (files/day)	File Size ¹ (MB/file)	Volume (MB/day)	Format	ECS Data Type
NCEP Ship/Buoy Observations	sfcYYMMDD.HHz scf.yymmdd.hhz (ship) bog.yymmdd.hhz (buoy)	4 4 4	TBD 1 .01 - .07	TBD 4 .15	GRIB [See Note 2]	NCEP07
NCEP Reynolds Blended SST Product	TBD oi.mean.bias.yymmdd	.143	10 .13	1.43 .02	GRIB [See Note 4 Note 2]	NCEP08

NCEP Aviation Analysis	TBD gblav.ThhZ.PGrbF00 (See Note 3)	TBD 4	TBD 13.5	TBD 54	GRIB [See Note 4 Note 2]	NCEP09
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Note 1: Data are distributed uncompressed

Note 2: GRIB format for NCEP gridded data sets documented in NOAA ON388.

Note 3: ' T' stands for 'time'. 'Z' stands for 'zulu'.

5.2 TOMS Ozone Ancillary Data Sets

The specific TOMS Ozone Ancillary Data Sets delivered by V0 System, and used by ECS to support TSDIS and ECS standard product generation include the following: Nimbus 7 Satellite Data, Meteor-3/TOMS Data, EP/TOMS Data, and ADEOS/TOMS Data. The product name, file name, frequency, file size, volume, format, and ECS Data Type (one of the required PDR PVL parameters which is used by the ECS Data Server--see Table 4-2) for each of these ancillary products are identified in Table 5-3. The file naming convention is explained as a footnote to this table.

Table 5-3. TOMS Ozone Ancillary Data Sets

Product Name ³	File Name	Frequency (files/day)	File Size ⁴ (KB/file)	Volume (KB/day)	Format	ECS Data Type
Nimbus 7 Satellite Data	TOMSN7_DAILY_yymmdd.HDF [See Note 1]	1	223	223	HDF	TOM01
Meteor-3/TOMS Data	TOMSM3_DAILY_yymmdd.HDF [See Note 1]	1	223	223	HDF	TOM02
EP/TOMS Data ²	TOMSEP_DAILY_yymmdd.HDF [See Note 1]	1	223	223	HDF	TOM03
ADEOS/TOMS Data	TOMSA1_DAILY_yymmdd.HDF [See Note 1]	1	223	223	HDF	TOM04

Note 1: In the filename convention, 'yyymmdd' is the date of product generation.

Note 2: EP stands for "Earth Probes."

Note 3: Details about TOMS data products can be found in the NASA Reference Publications, "Nimbus-7 TOMS Data Products User's Guide" and "Meteor-3 TOMS Data Products User's Guide", available from the archive facility.

Note 4: Data are distributed uncompressed

5.3 Metadata

Both core (generic) and dataset-specific (DSS) metadata are provided by the supplier system (i.e., ~~DAS~~ [GDAAC](#) Data Link Server or V0 System) to ECS. Data/metadata are provided together to ECS Ingest. The metadata are extracted (internally) by the ECS Ingest Subsystem. In order to have an intermediate level of service (i.e., required for products generated outside of EOSDIS, but used within EOSDIS) the generic metadata defined in Table 5-4 must be provided. In

Table 5-6. Required Dataset-Specific Metadata for NCEP Data

Metadata	Description
dss_1	Producer's title for the file

Metadata requirements are described in more detail in the document entitled, "SDPS Database Design and Database Schema Specifications for the ECS Project." ECS validates the required core (generic) metadata, based on ECS-determined ranges of values. Specific metadata used by the GSFC DAAC is documented in ~~GSFC DAAC Database Data Dictionary,~~ ["GSFC DAAC Database Data Dictionary,"](#) Version 5.1, 11/27/95.

~~Appendix A. Work-off Plan for ECS-GSFC DAAC ICD~~

ICD Issue #	ICD Para. #	Issue Priority*	ICD-Issue Type - Description	Work-off Plan-Task(s)	Projected Resolution Date	Risk Assessment**
4	Tbl-5-1 Tbl-5-2	B	TBD – The file names, frequency, file size, format, and volume for NCEP Ancillary Data-Sets to support MODIS and CERES product generation need to be defined.	ECS and the GSFC DAAC will coordinate to define these values.	9/96	1. Interface design will be incomplete. 2. Schedule for completion of interface design may be affected.

* Issue Priority Definition:

- A — Design impact; e.g., unresolved interface.
- B — Minimal design impact; e.g., content or format of a specific field unresolved.
- C — No design impact - administrative detail; e.g., reference document # not available.

** Risk Assessment Definition:

- 1 — Risk if issue is not resolved by CDR
- 2 — Risk if issues is not resolved by projected resolution date

EP	Earth Probes
ESDIS	Earth Science Data and Information System
FDDI	Fiber Distributed Data Interface
FNL	FiNaL Analysis and Forecast System, Global Analysis
FTP	File Transfer Protocol
<u>GDAAC</u>	<u>GSFC DAAC</u>
GOES	Geostationary Operational Environmental Satellite
GPI	GOES Precipitation Index
GRIB	GRid In Binary
GSFC	Goddard Space Flight Center
HDF	Hierarchical Data Format
I&T	integration and test
ICD	Interface Control Document
ICMP	Internet Control Message Protocol
IETF	Internet Engineering Task Force
IP	Internet Protocol
IR	Infrared
Ir1	interim release -1
IRD	Interface Requirements Document
KB	Kilobytes (10^3 bytes)
LAN	Local Area Network
MB	Megabyte (10^6 bytes)
MODIS	Moderate Resolution Imaging Spectroradiometer
MRF	Medium Range Forecast
N/A	Not Applicable
NCEP	National Centers for Environmental Predictions (previously was NMC)
NMC	National Meteorological Center (re-named NCEP)

NOAA	National Oceanic and Atmospheric Administration
OSI	Open Systems Interconnection
PAN	Production Acceptance Notification